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Stability of PAHs standards

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Polycyclic aromatic hydrocarbons (PAH) are a group of compounds that have had novel interest due to the finding of PAH in virgin olive oils in Europe.

The Scientific Committee on Food (SCF) has made a health risk assessment of PAH exposure from foods characterising 15 of the PAH as potentially genotoxic and carcinogenic for humans. This initialised the discussion about EU maximum levels for benzo[*a*]pyrene in certain foods containing fats and oils and in foods where smoking and drying processes might cause high levels of contamination. The outcome was EU maximum levels with a separately lower level for food intended for infants[1] as well as performance criteria for the sampling methods and the methods of analysis[2].

As a part of the laboratory quality assurance in connection to the analysis of PAHs, an experimental design was made to investigate the stability of the PAHs included in the analytical method, as instability has been reported[3].

The compounds investigated were: Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo[*a*]anthracene, Chrysene, Benzo[*b*]fluoranthene, Benzo[*j*]fluoranthene, Benzo[*k*]fluoranthene, Benzo[*e*]pyrene, Benzo[*a*]pyrene, Perylene, Indeno[1,2,3-*c,d*]pyrene, Dibenzo[*a,h*]anthracene, Benzo[*g,h,i*]perylene.

The GC-MS conditions used were: Column: 50 m DB-5MS (J&W), 0.25 mm i.d., 0.25µm film thickness. Carrier gas: Helium, 1 ml/min. 2 µl injected splitless, splitless time 1 min. Injector held at 280°C, Transfer-line 280°C. Temperature programme: 90°C for 1 min., 7°C/min. to 270°C, 1°C/min. to 280°C, 5°C/min. to 320°C in 10 min. PAH were quantified by comparing responses with those of standard mixtures.

A mixture of all the PAH were prepared in toluene and stored under different conditions; in sun light at room temperature, in dark at room temperature and stored at +5°C and –18°C, respectively. All standards were stored in sealed brown GC vials, as brown glassware is used in the laboratory.

The experimental design were as following: Standards were to be analysed just after preparation and after 1, 2 and 4 weeks, as well as after 6 and 12 month. After each storing period two samples were each diluted into two standard solutions and analysed giving 16 samples after each storing period, 4 samples per storing condition. The samples were analysed using the described GC-MS conditions. The quantified results were compared with the initial results and the recovery calculated. Results from the present work were then compared with previously reported results for the stability of PAHs standards[4].

In conclusion the presented results give information on the handling of PAH standards in the laboratory. Standards are stored in the laboratory in ampoules at –18°C and standard solutions are replaced every 12 months.

[1]. EC Commission Regulation No. 208/2005 of 4 February 2005 amending Regulation (EC) No 466/2001 as regards polycyclic aromatic hydrocarbons.

[2]. EC Commission Directive 2005/10/EC of 4 Februar 2005 laying down the sampling methods and the methods of analysis for the official control of the levels of benzo(a)pyrene in foodstuffs.

[3]. Kot-Wasik, A. Studies on fluorene stability in different liquid media. *Analytica Chimica Acta* 505 (2004) 289-299.

[4]. Vaessen, H.A.M.G., van de Kamp, C.G. and Jekel, A.A. Preparation and stability of ampouled polycyclic aromatic hydrocarbon solutions. *Z Lebensm Unters Forsch* (1988) 186, 308-310.